

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site ID: R036XB122NM

Site Name: Sandstone Hills

Precipitation or Climate Zone: 10-16"

Phase: _____

PHYSIOGRAPHIC FEATURES

Narrative:

The topography of this site varies from moderately steep to steep and occurs frequently in association with sandstone outcrop or badlands. Slopes generally exceed 15 percent and may, on occasion, range as high as 70 percent. Elevations range from about 6000 to 7800 feet.

Land Form:

1. Hill

2. Mesa

3. Outcrop

Aspect:

1. not significant

2.

3.

	Minimum	Maximum
Elevation (feet)	6000	7800
Slope (percent)	15	70
Water Table Depth (inches)	--	--
Flooding:	Minimum	Maximum
Frequency	--	--
Duration	--	--
Ponding:	Minimum	Maximum
Depth (inches)	--	--
Frequency	-	--
Duration	--	--

Runoff Class:

Hydrologic group D

CLIMATIC FEATURES

Narrative:

Average annual precipitation varies from about 10 inches to just over 16 inches. Fluctuations ranging from about 5 inches to 25 inches are not uncommon. The overall climate is characterized by cold dry winters in which winter moisture is less than summer. As much as half or more of the annual precipitation can be expected to come during the period of July through September. Thus, fall conditions are often more favorable for good growth of cool-season perennial grasses, shrubs, and forbs than are those of spring.

The average frost-free season is about 120 days and extends from approximately mid-May to early or mid-September. Average annual air temperatures are 50 degrees F or lower and summer maximums rarely exceed 100 degrees F. Winter minimums typically approach or go below zero. Monthly mean temperatures exceed 70 degrees F for the period of July and August.

Rainfall patterns generally favor warm-season perennial vegetation, while the temperature regime tends to favor cool-season vegetation. This creates a somewhat complex community of plants on a given range site which is quite susceptible to disturbance and is at or near its productive potential only when both natural warm- and cool- season dominants are present.

	Minimum	Maximum
Frost-free period (days):	51	171
Freeze-free period (days):	130	252
Mean annual precipitation (inches):	10	16

Monthly moisture (inches) and temperature (⁰F) distribution:

	Precip. Min.	Precip. Max.	Temp. Min.	Temp. Max.
January	.40	.91	12.9	47.0
February	.43	.65	16.6	51.2
March	.47	1.10	20.9	57.1
April	.30	.49	26.1	65.3
May	.46	.98	33.4	74.2
June	.51	.57	41.4	84.2
July	2.15	3.45	50.4	85.1
August	2.28	3.03	48.7	82.4
September	1.29	1.68	41.4	77.9
October	.81	1.12	29.4	69.2
November	.38	.71	19.1	57.3
December	.53	.95	13.1	48.9

Climate Stations:

Station ID	290640	Location	Augustine2E	From:	Period 05/01/ 26	To	07/31/ 00
<hr/>		<hr/>		<hr/>		<hr/>	
Station ID	296812	Location	Pietown 19NE	From:	09/01/ 88	To	07/31/ 00
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Station ID	297180	Location	Quemado	From:	Period 08/01/ 15	To	07/31/ 00
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				Period			

INFLUENCING WATER FEATURES

Narrative:

This site is not influenced by water from wetlands or streams.

Wetland description:

System	Subsystem	Class
N/A		

If Riverine Wetland System enter Rosgen Stream Type:

N/A

REPRESENTATIVE SOIL FEATURES

Narrative:

The soils found on this site are generally shallow to very shallow over sandstone. Surface textures are typically sandy loams, fine sandy loams, very fine sandy loams or loams, which often are gravelly, stony, or cobbly. Pockets of deeper soils occur in association with the site as well as occasional to frequent outcroppings of Sandstone and Badlands, either of which may affect livestock movements. Typically, permeability is moderate to moderately rapid, and the available water capacity is low.

Parent Material Kind: Colloquium

Parent Material Origin: Sandstone - unspecified

Surface Texture:

1. Sandy loams
2. Fine sandy loams
3. loams

Surface Texture Modifier:

1. N/A
2.
3.

Subsurface Texture Group: --

Surface Fragments <=3" (% Volume): --

Surface Fragments >3" (% Volume): --

Subsurface Fragments <=3" (% Volume): 8-24%

Subsurface Fragments >=3" (% Volume): --

	Minimum	Maximum
Drainage Class:	--	well
Permeability Class:	Moderately slow	Moderately rapid
Depth (inches):	0	20
Electrical Conductivity (mmhos/cm):	0	2.0
Sodium Absorption Ratio:	--	--
Soil Reaction (1:1 Water):	7.4	8.4
Soil Reaction (0.1M CaCl2):	--	--
Available Water Capacity (inches):	--	1
Calcium Carbonate Equivalent (percent):	--	--

PLANT COMMUNITIES

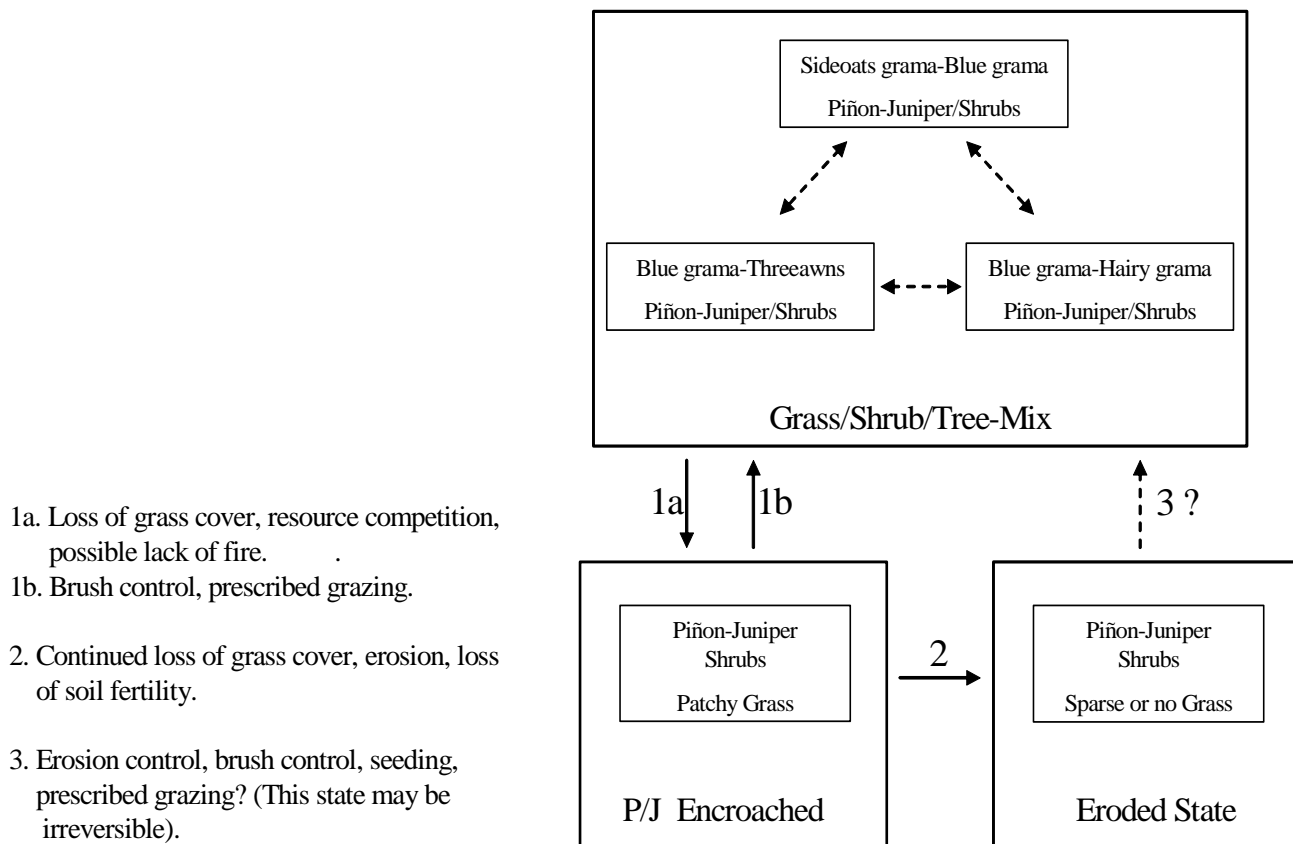
Ecological Dynamics of the Site:

Overview

This site occurs on hills and ridges, the soils are shallow to sandstone and areas of sandstone outcrop are common, especially along ledges and escarpments. This site is associated with loamy sites that occur along drainageways or depressions dissecting Sandstone Hills. This is a moderately productive site characterized by a mixture of warm and cool-season grasses, shrubs, and scattered trees. Sideoats grama, blue grama, little bluestem, Indian ricegrass, New Mexico feathergrass, galleta, and occasionally black grama are grasses common to this site. Piñon pine and juniper species characterize the tree aspect, while shrubs including skunkbush sumac, oak, mountain mahogany, and winterfat are common shrub species. The loss of grass cover and the associated decrease in resource competition by grasses are believed to facilitate the encroachment of woody species and initiate the transition to the Piñon-Juniper Encroached state. A decrease in the natural fire frequency may facilitate this transition, if fire historically occurred on this site following periods of favorable grass production. Brush control in conjunction with prescribed grazing is necessary to remove the competitive advantage of shrubs and trees and reestablish grass dominance. Loss of herbaceous cover combined with steep slopes and sandy surface textures make this site highly susceptible to both water and wind erosion. Once the transition to an Eroded State has occurred, the ability to reverse the transition is constrained by low precipitation, low available water capacity, steep slope, shallow soils, and soil degradation.

Plant Communities and Transitional Pathways (diagram)

MLRA 36, WP-2 Sandstone Hills



Plant Community Name: Historic Climax Plant Community

Plant Community Sequence Number: 1 Narrative Label: HCPC

Plant Community Narrative:

State Containing Historic Plant Community

Grass/Shrub/Tree-Mix: Grasses are the dominant component of the historic plant community. Sideoats grama is the dominant grass with blue grama occurring as the sub-dominant. Little bluestem, Indian ricegrass, New Mexico feathergrass, and galleta are also common. Black grama is favored at lower elevations, while grasses such as pine dropseed, Arizona fescue, muttongrass, and prairie junegrass may increase in representation at higher elevations. Shrub species such as mountain mahogany, and oak are favored at higher elevations. Shrubs and half-shrubs such as winterfat are common. Bigelow sagebrush, spineless horsebrush, and broom snakeweed are encountered in small amounts. Oneseed juniper is often the most common tree at lower to mid elevations, with piñon increasing at higher elevations. Changes in composition to the historic plant community may occur due to overgrazing and drought. Species such as sideoats grama, little bluestem, many of the cool-season grasses, mountain mahogany, and winterfat typically decrease in response to overgrazing. A blue grama-threeawn or blue grama-hairy grama dominated community may result.

Diagnosis: Grasses are dominant and cover is fairly uniform with few large bare areas present. Trees and shrubs are common with a combined canopy cover averaging fifteen percent. Evidence of erosion such as pedestalling of grasses, rills and gullies are infrequent.

Ground Cover (Average Percent of Surface Area).

Grasses & Forbs	14
Bare ground	48
Surface gravel	
Surface cobble and stone	20
Litter (percent)	9
Litter (average depth in cm.)	1
Surface Gravel (% cover)	

Plant Community Annual Production (by plant type):

Plant Type	Annual Production (lbs/ac)		
	Low	RV	High
Grass/Grasslike	150	310	469
Forb	15	31	47
Tree/Shrub/Vine	40	83	125
Lichen	--	--	--
Moss	--	--	--
Microbiotic Crusts	--	--	--
Totals	200	413	625

Plant Community Composition and Group Annual Production:

Plant Type - Grass/Grasslike

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production
1	BOCU	Sideoats grama	83-124	83-124
2	BOGR2	Blue grama	41-62	41-62
3	SCSC	Little bluestem	21-41	21-41
4	MUMO BLTR ACHY FEAR2 FEOV	Mountain muhly Pine dropseed Indian ricegrass Arizona fescue Sheep fescue	21-41	21-41
5	HENE5 PASM HECO26 POFE KOMA ELEL5	NM Feathergrass Western wheatgrass Needle-and-Thread Muttongrass Prairie junegrass Bottlebrush squirreltail	41-62	41-62
6	MUWR PLJA	Spike muhly Galleta	4-21	4-21
7	SPCR LYPH BOHI2 ARIST	Sand dropseed Wolftail Hairy grama Threeawn spp.	4-12	4-12
8	BOER4	Black grama	4-21	4-21

Plant Type - Tree/Shrub/Vine

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production
9	PIED JUNIP	Pinyon pine Juniper	21-41	21-41
10	RHTR QUERC MUMO	Skunkbush sumac Oak brush Mountain mahogany	4-21	4-21
11	ARBI3 KRLA2	Bigelow sagebrush Winterfat	4-21	4-21
12	GUSA2 TECA2 ERNAN5	Broom snakeweed Spineless horsebrush Rubber rabbitbrush	4-13	4-13

Plant Type – Forb

13	2FP	Perennial forb	12-33	12-33
14	2FA	Annual forb	4-12	4-12

Plant Type - Lichen

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production

Plant Type - Moss

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production

Plant Type - Microbiotic Crusts

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production

Plant Growth Curves

Growth Curve ID NM 0313

Growth Curve Name: HCPC

Growth Curve Description: WP-2 Mixed warm/cool season grassland with shrubs and scattered trees.

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
0	0	5	7	10	15	20	25	13	5	0	0

Additional States:

Piñon-Juniper Encroached: This state is characterized by an increase of piñon and/or juniper. Piñon tends to dominate at higher elevations, giving way to juniper at lower elevations. Other woody species such as oakbrush, rabbitbrush, spineless horsebrush, and Bigelow sagebrush may also increase in representation. Blue grama is typically the dominant grass species.

Diagnosis: Piñon and juniper are found at increased densities relative to the Grass/Shrub/Tree-Mix. Grass cover is patchy with large bare areas present. Blue grama is typically the dominant grass species. Evidence of erosion such as pedestalling of plants, elongated water flow patterns, litter dams, and rills may be common.

Transition to Piñon-Juniper Encroached (1a) Persistent loss of grass cover, the associated decreased competition by grasses, and lack of fire are believed to facilitate the encroachment of piñon/juniper.^{1,3, 5, 7} Loss of herbaceous cover due to overgrazing and drought can provide competition free areas for piñon/juniper seedling establishment, and afford a competitive advantage to established woody species. However, the natural spatial variability of ground cover may also allow woody species to establish on existing bare areas.⁴ As piñon/juniper canopy cover increases, total herbaceous biomass decreases.⁶ Loss of herbaceous cover can also reduce fuel levels beyond the point capable of carrying fire. If fire was historically important in the development of plant communities on Sandstone Hills ecological sites by suppressing piñon/juniper seedlings, then disruption of natural fire frequency may facilitate piñon/juniper encroachment.⁵

Key indicators of approach to transition:

- Decrease or change in composition or distribution of grass cover.
- Increase in size and frequency of bare patches.
- Increase in amount of juniper, piñon, and shrub seedlings.

Transition back to Grass/Shrub/Tree-Mix (1b) Brush control is necessary to reduce the competitive influence of piñon/juniper and facilitate grass recovery. Prescribed grazing will help ensure adequate rest following brush control and will assist in the establishment and maintenance of grass cover.

Eroded State: This state is characterized by accelerated erosion and loss of soil fertility.

Diagnosis: Grass cover is minimal usually restricted to scattered patches of blue grama or widely scattered individual bunchgrasses. Rills, gullies, and blowout areas are common often exposing areas of bedrock and tree roots.

Transition to Eroded State (2) Continued loss of grass cover and loss of soil fertility in conjunction with accelerated wind and water erosion can initiate the transition to an Eroded State. Steep slopes, sandy loam textures, and shallow soil depth make this site susceptible to accelerated erosion if adequate cover is not maintained.²

Key indicators of approach to transition:

- Decrease in grass and litter cover.
- Pedestalling of plants.
- Wind scoured areas.
- The presence of rills and small gullies.

Transition back to Grass/Shrub/Tree-Mix (3)? Once the transition to an Eroded State has occurred, the ability to reverse the transition is constrained by low precipitation, low available water capacity, steep slope, shallow soils, and soil degradation. Brush control will be necessary to reduce competition for resources by piñon/juniper. Erosion control structures in conjunction with seeding will be necessary to reestablish hydrology and grass dominance. Prescribed grazing will help ensure adequate rest following seeding and brush control practices and will assist in the establishment and maintenance of grass cover. The degree to which this site is capable of recovery is dependent on the extent of degradation to the soil resources.

ECOLOGICAL SITE INTERPRETATIONS

Animal Community:

This range site provides habitats which support a resident animal community that is characterized by mule deer, gray fox, bobcat, desert cottontail, cliff chipmunk, rock squirrel, Stephen's woodrat, pinyon mouse, harlequin quail, red-shafted flicker, scrub jay, pinyon jay, bridled titmouse, common bushtit, rufous-sided towhee, chipping sparrow, red-spotted toad, collared lizard, tree lizard, desert short-horned lizard, mountain patch-nosed snake, and black-tailed rattlesnake.

Where cliffs and ledges are found associated with the site, golden eagle, great horned owl, prairie falcon, Say's phoebe, white-throated swift, and cliff swallow nest or hunt over this site. Mourning dove and black-chinned sparrow nest on the site. Where it occurs adjacent to the ponderosa pine forests, elk may range in to feed. In high production years, Merriam's turkey and band-tailed pigeon feed on this site. The western bluebird winters and the mountain lion occasionally hunts on this site.

Hydrology Functions:

The runoff curve numbers are determined by field investigations using hydrologic cover conditions and hydrologic soil groups.

Hydrologic Interpretations	
Soil Series	Hydrologic Group

Recreational Uses:

The site has moderate to high potential for semi-improved picnicking and camping sites which are designed with erosion hazard and other problems inherent to shallow soils in mind. It also offers potential for hiking, horseback riding, hunting, nature observation, and photography. On occasion, ancient and gnarled junipers are found which, for many, provide a very striking source of natural beauty. This is especially true when they are seen against a backdrop of distant open-space landscapes typical of the region in which the site is found.

Wood Products:

This site has a limited potential for wood products, which is restricted almost entirely to fence post and firewood products.

Other Products:

This site is suitable for grazing by most kinds and classes of livestock without regard to season of the year. Where slopes are steep, however, accessibility may become limited and stocking rates need to be properly adjusted. Deterioration of the potential plant community due to inadequately managed grazing is usually typified by an increase in low-value grasses such as threeawns and hairy grama as well as such woody species as pinyon, juniper, rabbitbrush, oakbrush, and broom snakeweed. Under severe deterioration, erosion hazard becomes quite high, and the site may become severely limited for grazing. Mechanical brush control and seeding are generally impractical on the site due to shallow soils and steep slopes, and recovery using improved grazing management alone, is very slowly achieved.

Other Information:	
Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month	
Similarity Index	Ac/AUM
100 - 76	4.5 - 5.5
75 - 51	5.2 - 8.0
50 - 26	7.5 - 15.0
25 - 0	15.0 +

Plant Preference by Animal Kind:

	Code	Species Preference	Code
Stems	S	None Selected	N/S
Leaves	L	Preferred	P
Flowers	F	Desirable	D
Fruit/Seeds	F/S	Undesirable	U
Entire Plant	EP	Not Consumed	NC
Underground Parts	UP	Emergency	E
		Toxic	T

Animal Kind: Livestock

Animal Type: Cattle

Common Name	Scientific Name	Plant Part	Forage Preferences											
			J	F	M	A	M	J	J	A	S	O	N	D
Sideoats grama	<i>Bouteloua curtipendula</i>	EP	D	D	D	D	D	D	D	D	D	D	D	D
Blue grama	<i>Bouteloua gracilis</i>	EP	D	D	D	D	P	P	P	P	P	D	D	D
Little bluestem	<i>Schizachyrium scoparium</i>	EP	D	D	P	P	P	P	P	D	D	D	D	D
NM Feathergrass	<i>Hesperostipa neomexicana</i>	EP	D	D	P	P	P	D	D	D	D	D	D	D
Needle-and-Thread	<i>Hesperostipa comata</i>	EP	D	D	P	P	P	D	D	D	D	D	D	D
Indian ricegrass	<i>Achnatherum hymenoides</i>	EP	P	P	P	P	P	P	P	P	P	P	P	P
Bottlebrush squirreltail	<i>Elymus elymoides</i>	EP	U	U	D	D	D	U	U	U	D	D	D	U
Western wheatgrass	<i>Pascopyrum smithii</i>	EP	D	D	P	P	P	D	D	D	D	D	D	D
Mountain muhly	<i>Muhlenbergia montana</i>	EP	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S

Supporting Information

Associated Sites:

<u>Site Name</u>	<u>Site ID</u>	<u>Site Narrative</u>
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Similar Sites:

<u>Site Name</u>	<u>Site ID</u>	<u>Site Narrative</u>
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State Correlation:

This site has been correlated with the following states:

Inventory Data References:

<u>Data Source</u>	<u>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
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Type Locality:

Relationship to Other Established Classifications:

Other References:

1. Brockway, D.G., R.G. Gatewood, and R.B. Paris. 2002. Restoring grassland savannas from degraded pinyon-juniper woodlands: effects of mechanical overstory reduction and slash treatment alternatives. *Journal of Environmental Management*. 64: 179-197.
2. Davenport, D.W., D.D. Breshears, B.P. Wilcox, and C.D. Allen. 1998. Viewpoint: Sustainability of piñon-juniper ecosystems-a unifying perspective of soil erosion thresholds. *Journal of Range Management*. 51: 231-240.
3. Johnsen, T.N., Jr. 1962. One-seeded juniper invasion of northern Arizona grasslands. *Ecological Monographs*. 32:187-207.
4. Jurena, P.N. and S. Archer. 2003. Woody plant establishment and spatial heterogeneity in Grasslands. *Ecology* 84: 907-919
5. Miller, R.F., and R.J. Tausch. 2001. The role of fire in pinyon and juniper woodlands: a descriptive analysis. Pages 15–30 in K.E.M. Galley and T.P. Wilson (eds.). *Proceedings of the Invasive Species Workshop: the Role of Fire in the Control and Spread of Invasive Species. Fire Conference 2000: the First National Congress on Fire Ecology, Prevention, and Management*. Miscellaneous Publication No. 11, Tall Timbers Research Station, Tallahassee, FL.
6. Pieper, R.D. 1990. Overstory-understory relations in pinyon-juniper woodlands in New Mexico. *Journal of Range Management*. 43: 413-415.
7. Richardson, D.M. and W.J. Bond. 1991. Determinants of plant distribution: Evidence from pine invasions. *The American Naturalist*. 137: 639-668

Data collection for this site was done in conjunction with the progressive soil surveys within the New Mexico and Arizona Plateaus & Mesas Major Land Resource Area of New Mexico. This site has been mapped and correlated with soils in the following soil surveys: McKinley, Catron, Cibola, Socorro and Sandoval.

Characteristic Soils Are:

Other Soils included are:

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Site Description Approval:

<u>Author</u>	<u>Date</u>	<u>Approval</u>	<u>Date</u>
Don Sylvester	02/15/80	Don Sylvester	02/15/80

Site Description Revision:

<u>Author</u>	<u>Date</u>	<u>Approval</u>	<u>Date</u>
Brenda Simpson	08/20/02	George Chavez	06/10/05
David Trujillo	06/10/05		